SAFETY STIRRUP

Cross Reference to Related Applications

This application is a continuation-in-part of U.S. Patent Application Serial No. 10/048,078 filed 20 July 2000, the entire disclosure of which is incorporated herein by this reference.

BACKGROUND

The present invention relates to a horse riding stirrup. In particular, the present invention relates to a safety stirrup which prevents the rider's foot being retained in the stirrup in the event of the rider being dismounted or thrown from the horse. More particularly, the present invention relates to a novel two-way release safety stirrup.

Stirrups are well known in the prior art and have been used for hundreds of years. In general, a stirrup includes a D-shaped metal structure with a slot located in the center of the arcuate portion of the D-shaped structure for attachment of a stirrup strap, which in turn connects to a saddle. In use, the rider's foot is inserted into the D-shaped structure and the straight, base portion known as a footplate is located adjacent the sole of the rider's boot while the arcuate portion of the stirrup is located adjacent the upper of the rider's boot.

One of the problems associated with stirrups of the prior art is that if the rider is dismounted or thrown, they may not have sufficient time to withdraw their foot from the stirrup. Often the D-shaped structure fits firmly around the rider's boot, thus trapping the rider's foot. If the foot remains trapped in the stirrup, and the horse continues moving, the rider can be dragged along, often causing serious injury or death. Each year many people are injured or killed in this type of accident.

In order to overcome this well known problem, attempts have been made to provide safety stirrups that release the rider's foot if the rider is dismounted or thrown from the horse. One form of safety stirrup of the prior art includes a frangible or weakened portion adjacent the point where the stirrup is attached to the stirrup strap. If the rider is dismounted or thrown and their foot remains caught in the stirrup, the frangible portion breaks, releasing the stirrup from the stirrup strap. However this type of safety stirrup suffers from the drawback that it may break away from the stirrup strap during particularly hard riding, leaving the rider unbalanced, and unable to control the horse using his or her feet. Furthermore, the rider cannot re-mount until a new stirrup is fitted, which can be difficult or inconvenient if the stirrup breaks away in an isolated

area. Furthermore, the frangible stirrup does not prevent leg injuries and is therefore of limited value for novice or disabled riders. A further disadvantage is that these stirrups are very bulky in the region where they attach to the stirrup strap and the increased bulk often causes excessive wear to the rider's clothing.

Another type of safety stirrup is disclosed in EP-0 065 714. This safety stirrup comprises a U-shaped release member supported at either end of the U within a D-shaped mounting member. During normal riding, the D-shaped mounting member and the U-shaped release member lie in the same plane.

During normal riding, the sole of the rider's boot rests against the flat portion, or footplate, of the D-shaped member. If the rider is dismounted, the rider's foot causes the U-shaped release member to pivot out of the plane of the stirrup, concomitantly causing the footplate of the D-shaped mounting member to release at one end while the other end pivots away from the rest of the D-shaped mounting member. This allows the rider's foot to be released from the stirrup.

Other safety stirrups are described in AU-39229/95, US 341,987 and DE-2003387. These safety stirrups also comprise articulated members that separate and release the rider's foot if the rider is dismounted or thrown. They all rely on forward or alternatively, backwards motion of the rider's foot as the rider is dismounted. However they are not specifically designed to release if the rider's foot moves upwards as he or she is dismounted, a common occurrence, particularly if the horse is bucking or jumping.

Another, quite different type of safety stirrup is described in US-1,276,819. The stirrup comprises a pair of hingedly engaged, downwardly extending arms forming a U-shaped member, with the footplate hingedly engaged adjacent the end of one of the arms and releasable engaged adjacent the end of the other arm. The stirrup further comprises a vertically slideable plate which in use rests against the upper of the rider's boot. If the rider's foot moves upwards, out of the normal in-use position, the plate slides upwards, activating a mechanism which causes one end of the footplate to release from one arm of the U-shaped member, thus releasing the rider's boot.

Yet another type of safety stirrup is disclosed in US 1,321,653. This safety stirrup comprises U-shaped mounting member having resilient, upturned arms that deform in response to strain. In this case, the foot support member has a lug portion that prevents it from upward movement, thus if the rider falls or is otherwise dismounted, the abnormal strain imposed on the stirrup causes the foot rest to disengage its keeper, the resilient arms of the U-shaped member deforming from the normal use position so that

the foot rest can completely disengage from the arms.

Most safety stirrups can be classed as "one-way" release or "two-way" release stirrups. The "one-way" stirrup requires that the rider's foot be inserted in the stirrup in one particular direction or from one particular side if the release mechanism is to operate properly. Pressure exerted in the forward direction, that is, towards the rider's toe, will not cause the safety stirrup to release. Only pressure exerted in the rearward direction, that is, towards the rider's heel will cause the safety stirrup to release. Because the stirrup only opens up in one way or one direction, it is important that the rider's foot is inserted from the correct side of the stirrup, otherwise the release mechanism will not operate properly.

Conversely a "two-way" safety stirrup will release if pressure is exerted from either the forward or rearwards direction, hence the rider can place their foot in a two-way stirrup from either direction. For example a typical one-way safety stirrup is disclosed in AU-62109/90.

The safety stirrup of AU-62109/90 holds the rider's foot in a restraint that separates when the restraint is pivoted out of the normal position. International application PCT/AU97/00398 discloses another one-way safety stirrup. The safety stirrup of PCT/AU97/00398 also comprises a restraining means pivotally mounted between two extremities of an inverted U-shaped mounting means.

As mentioned above, when attached correctly to stirrup straps, the one way stirrups of the prior art release and open up only if the rider's foot pivots rearwards. Because they only open in the rearwards direction, they cannot open up if the rider's foot pivots forwards or pushes hard into the stirrup, as may occur as a result of very hard riding such as during a polo match or rodeo riding. While the one-way stirrup works well for all standards of riding including very hard riding, one-way stirrups of the prior art suffer from the disadvantage that they do not open up in response to certain types of riding accidents.

For example, a one way stirrup will not release if the rider's foot exerts strong forward pressure as the rider is thrown over the head of the horse, or to the side of the horse or in the course of jumping. Another problem with some designs of one-way stirrup of the prior art is that the rider's foot may still be retained within the U-shaped mounting means even when the restraint is pivoted out of the normal position and separates. Furthermore, as already mentioned, the correct operation of one-way stirrups is conditional on the stirrup being connected to the stirrup strap in one specific

orientation, such that the rider's boot is inserted only in one particular direction into the stirrup. If the stirrup is oriented in the wrong direction it can release unexpectedly and lead to rider injury and/or loss of control of the horse. There is a risk that some riders, in particular novice riders, may unwittingly connect a one-way stirrup to the stirrup strap in the wrong orientation.

For these reasons, many riders prefer two-way stirrups. An example of a two-way safety stirrup of the prior art is disclosed in AU-26089/95. AU-26089/95 discloses a stirrup in which the rider's boot is held in a D-shaped restraint means which is pivotally mounted between two extremities of an inverted U-shaped mounting means. If the rider is dismounted from the horse, the restraint means pivots out of the normal position, one of the pivotal mountings releases from the mounting member, and the restraint means separates, thus releasing the foot from both the restraint and the inverted U-shaped mounting means.

One of the disadvantages of two-way stirrups of the prior art is that the restraint means can be pushed out of the normal position by the movement and pressure exerted by hard riding. The amount of forward pressure required to cause the safety stirrup to release is approximately the same as the amount of rearward pressure required to cause release. Professional riders such as jockeys, mountain cattlemen, rodeo riders, polo players and the like exert enormous pressure on stirrups as they pull up a horse or lean back to resist being thrown over the horse's head. The pressure of the rider's foot being pressed hard into the stirrup can cause a two-way stirrup to suddenly release, unbalancing the rider and potentially causing them to fall from the horse.

Typically, the safety stirrups of the prior art also have the disadvantages of being made of metal, and thus being relatively heavy, and of having relatively complicated construction. In general, the stirrups of the prior art comprise articulated members or complicated joints between members which separate when the rider is dismounted - the articulation and complicated construction contributing to the cost of construction.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a two-way safety stirrup that provides the desirable advantages of release in the event of the rider being dismounted, but which is less prone to unexpected release when pressure is applied in the forward direction. It is a further object to provide a safety stirrup that is of far simpler construction than stirrups of the prior art, yet is not as prone to unexpected release and which can be made of materials other than metal (such as plastics and polymers) so that

the stirrups are more economical to manufacture and are of comparatively light weight.

Accordingly, the present invention provides a safety stirrup including:

a generally U-shaped mounting member, and

a foot support member for receiving a rider's foot, such that when the rider's foot is in the normal use position, the foot support member is restrained by one or more mountings,

wherein vertically upward movement of the rider's foot out of the normal use position causes the one or more mountings to release the foot support member sufficiently that the foot support member can move in the same direction as the rider's foot until the foot support member is fully disconnected from the U-shaped mounting member.

It is preferred but not essential that the mounting includes one or more projections. In a particularly preferred embodiment the present invention provides a safety stirrup including:

a generally U-shaped mounting member, and

a foot support member for receiving a rider's foot, such that when the rider's foot is in the normal use position, the foot support member is retained by one or more mountings having projections,

wherein during normal use the projections are located in recesses but vertically upward movement of the rider's foot out of the normal use position causes the one or more mountings to release the foot support member sufficiently that the foot support member can move in the same direction as the rider's foot until the foot support member is fully disconnected from the U-shaped mounting member, the projections moving in their respective recesses and rotating in the same direction as the rider's foot prior to the foot support member being fully disconnected from the U-shaped mounting member.

The term "normal use position" is used throughout the specification to denote the position of the riders foot in the stirrup when a rider is mounting or mounted on a horse to which the stirrup is fitted. When the rider's foot is in the normal use position, the U-shaped mounting member and the foot support are generally co-planar, or have parallel planes. During normal riding the plane(s) is/are approximately vertical and the rider's foot is approximately perpendicular to the plane of the U-shaped mounting member, the toe pointing in the forward position and the heel oriented in the rearward direction.

The present invention makes use of the fact that when the rider's foot moves out of the normal in-use position, such as when the rider is dismounted, there is a vertical

component to the movement of the rider's foot. Typically, the rider's foot will move upwards relative to the U-shaped member and then rotate, or just rotate, both movements including a significant vertical force component. In the safety stirrup of the present invention the vertical force component causes vertical movement of the foot support relative to the U-shaped member, such that the foot support is shifted into a position where it can to move in the same forward or rearwards direction as the rider's foot until the foot support is fully disconnected from the U-shaped mounting member.

The generally U-shaped mounting member is typically in the shape of an inverted curve or takes the shape of three sides of a square or rectangle. Typically the foot support is D-shaped, and in normal use the sole of the rider's boot is adjacent the straight part of the D which comprises the footplate.

When there is one mounting it may be located on an arm of the U-shaped mounting member or alternatively it may be located on the foot support. When there are two mountings, they may each be located on an arm of the U-shaped mounting member. Alternatively, one mounting may be located on one arm of the U-shaped mounting member while the other mounting is located on the foot support. As another alternative, both mountings may be located on the foot support.

Typically the mounting includes one or more projections which can be received in complementary shaped recesses. The one or more projections may be located on the U-shaped mounting member and received in recesses in the foot support. Alternatively, the one or more projections may be located on the D-shaped foot support, and received in recesses in the U-shaped mounting member. In a particularly preferred embodiment, each projection is of generally cylindrical shape, or a boss of convenient cross section.

The complementary shaped recess or recesses may be of any convenient shape and depth, sufficient to retain the one or more projections and resist rotation of the foot support relative to the U-shaped mounting member when the stirrup is in normal use. Typically, in response to vertical force exerted by the rider's boot, the projection(s) moves in the recess(es) to a position which allows the D-shaped foot support to move in the same direction as the rider's foot.

For example, the recess(es) may be shaped to include an indentation in which the primary projection resides during normal use, and guide or passage along which the projection(s) may move in the forwards or rearwards direction in response to the force exerted by the rider's foot when the rider is dismounted.

The one or more mountings may include an additional projection locatable in a

recess adjacent an end of the U-shaped member and footplate of the foot support. Typically the projection and additional projection are located on the same element (either the U-shaped mounting member or the foot support). In a particularly preferred embodiment, the projection and additional projection are located on the D-shaped foot support, and received in recesses in the U-shaped mounting member. Alternatively the projection may be located on different elements. In this embodiment, typically the projection is located on the foot support while the additional projection is located on the U-shaped mounting member.

In a particularly preferred embodiment, two additional projections are located on the D-shaped foot support and comprise a long neck and bulbous head, forming a "mushroom" shape. The necks are received in slot-shaped recess at either end of the U-shaped mounting member. Typically, in response to vertical force exerted by the rider's boot, the additional projection moves in the recess to a position which allows the D-shaped foot support to move in the same direction as the rider's foot.In this particular embodiment, it is preferred that the projection and additional projection are on the D-shaped foot support and are located in recesses in the U-shaped mounting member. In response to vertical movement of the rider's foot, the projection and additional projection move vertically upwards in their respective recesses. As the rider's boot rotates, the projection on the mounting follows a curved passage in the recess following the direction of rotation of the rider's boot, until the projection disengages from the U-shaped member. At the same time, the additional projection rotates in its recess and finally passes out through the slot shaped recess, thus completely disengaging the D-shaped foot support from the U-shaped mounting member.

The safety stirrup of the present invention has the advantage that the release characteristics can be adapted to the rider's skill level and the type of riding being carried out. For example, the projection and additional projection can be configured such that the rider's foot has to exert greater than normal force in either the forward or rearwards directions in order for the foot support to fully disconnect from the U-shaped mounting member. A professional rider who does hard riding and generally exerts a great deal of force on the stirrup could use a safety stirrup in which the projections fit deeply into the recesses so that a great deal of forward or backwards force would need to be imposed before the foot support could be fully disconnected from the U-shaped mounting member. For example, springs or other biasing means could be used to resist movement of the projection and/or additional projection in their recess. Alternatively, for a novice

rider who is more likely to fall and less likely to exert a great deal of force on the stirrup, the recesses could be very shallow and shaped so that relatively less forward or backward pressure would be required to fully disconnect the foot support from the U-shaped mounting member.

Furthermore the shape of the projections and corresponding recess could be adapted so that it is easier to disengage the projection from the recess when force is exerted in the forward direction rather than the backward direction. However, as with one-way stirrups, this embodiment would only work properly if the stirrup were mounted on the saddle strap in the correct orientation.

The stirrup strap may be passed through the stirrup between the U-shaped member and the foot support. Alternatively the U-shaped member may be adapted for attachment of a stirrup strap using any conventional arrangement such as a slot in the U-shaped mounting member through which the strap can be threaded, or a bar around which the strap can be wrapped, or a known toggle-type connection.

Typically, the flat, straight section of the D-shaped foot support comprises the footplate against which the sole of the rider's boot rests during mounting or normal riding. The foot support can be in any convenient form, such as a bar, case plate or slotted plate that is oriented in a generally horizontal plane during normal use.

While the safety stirrup of the present invention could be manufactured out of metal, the design is sufficiently simple that it could be manufactured out of other convenient materials such as polymers or plastic, and composites such as carbon/graphite composites. Polymers and plastic provide weight advantages over metal, which is the traditional material of construction for stirrups. Furthermore, polymers, unlike most metals, have the ability to stretch and therefore easily redistribute load forces. Preferably, the safety stirrup of the present invention is formed by injection molding.

The invention will now be further described with reference to the following drawings that depict non-limiting embodiments of the safety stirrup of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 includes plan views of several embodiment of the safety stirrup of the present invention in the normal in-use position. Specifically,

Figure 1a is a plan view of one embodiment of the safety stirrup having two projections and two additional projections all located on the foot support.

Figure 1b is a plan view of one embodiment of the safety stirrup having one

mounting and an additional projection located on the foot support.

Figure 1c is a plan view of one embodiment of the safety stirrup having one mounting and an additional projection located on the foot support plus another mounting and another additional projection located on the U-shaped mounting member.

Figure 1d is a plan view of one embodiment of the safety stirrup having one mounting and an additional projection located on one arm of the U-shaped mounting member.

Figure 1e is a plan view of one embodiment of the safety stirrup having a two mountings and two additional projections all located on the U-shaped mounting member.

Figure 1f is a plan view of one embodiment of the safety stirrup having one mounting comprising a projection located on the foot support and an additional projection located on the U-shaped mounting member.

Figure 2a is a perspective view towards the side of a D-shaped foot support of a safety stirrup having a mounting and additional projection on the foot support, such as, for example, the safety stirrup of Figure 1a, 1b or 1c.

Figure 2b is a view of the inside of one arm of the U-shaped mounting, suitable for receiving the mounting and additional projection of Figure 2a.

Figure 2c is a view of the outer side of the arm depicted in Figure 2b.

Figure 3a is a perspective view towards the side of a D-shaped foot support of a further embodiment of the safety stirrup of the present invention.

Figure 3b is a view of the inside of one arm of the U-shaped mounting member of the further embodiment.

Figure 3c is a view of the outer side of the arm depicted in Figure 3b.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1a shows an inverted U-shaped mounting member (5) comprising a horizontal bar (7) to which the stirrup strap may be attached. Located within the U-shaped mounting member is a D-shaped foot support (1) for receiving a rider's foot, including a footplate (12) which rests against the sole of the rider's boot.

When the stirrup is in normal use, the foot support (1) lies in the same plane as the U-shaped mounting member (5) and is held in place by two mountings located on either side of the U-shaped mounting member. In this embodiment the projections of the mountings and two additional projections are all located on the foot support.

Figure 1b again shows an inverted U-shaped mounting member (5') comprising a horizontal bar (7'). Located within the U-shaped mounting member is a D-shaped foot

support (1') including a footplate (12'). In this embodiment there is one mounting, the projection and additional projection being located on the foot support.

Figure 1c again shows an inverted U-shaped mounting member (5") comprising a horizontal bar (7"). Located within the U-shaped mounting member is a D-shaped foot support (1") including a footplate (12"). In this embodiment there are two mountings, one having a projection and additional projection located on the foot support while the other mounting has a projection and additional projection located on the U-shaped mounting member.

Figure 1d again shows an inverted U-shaped mounting member (5'") comprising a horizontal bar (7'"). Located within the U-shaped mounting member is a D-shaped foot support (1'") including a footplate (12'"). In this embodiment there is one mounting, the projection and additional projection being located on the U-shaped mounting member.

Figure 1e again shows an inverted U-shaped mounting member (5^{iv}) comprising a horizontal bar (7^{iv}). Located within the U-shaped mounting member is a D-shaped foot support (1^{iv}) including a footplate (12^{iv}). In this embodiment there are two mountings, each having a projection and additional projection all located on the U-shaped mounting member.

Figure 1f again shows an inverted U-shaped mounting member (5^{v}) comprising a horizontal bar (7^{v})Figure 1b again shows an inverted U-shaped mounting member (5^{v}) comprising a horizontal bar (7^{v}). Located within the U-shaped mounting member is a D-shaped foot support (1^{v}) including a footplate (12^{v}). In this embodiment there is one mounting, the projection of the mounting being located on the foot support while the additional projection is located on the U-shaped mounting member.

Figure 2a is a perspective view towards a side of a D-shaped foot support on which is located a cylindrical shaped projection (10) and mushroom shaped additional projection (12). This mounting could for example, be used in the embodiments depicted in Figures 1a, 1b or 1c.

Figure 2b is a view of one arm of the U-shaped mounting member showing recesses (10', 11') for receiving the projection (10) and additional projection (11) of Figure 2a. Recess (11') receives the mushroom shaped projection (11), the neck of the mushroom residing in the slot-shaped part of the recess. The head of the mushroom is located entirely within the U-shaped mounting member and is not visible when the stirrup is in normal use. A biasing means, in this case a spring (15), is located within the recess. Recess (10') receives the cylindrical shaped projection (10). In the event of the

rider being dismounted, the rider's foot moves out of the normal in-use position. The vertical component of the force exerted by the rider's foot causes the primary projection to move out of the indentation (10") in which it rests, into the passage, or curved part of the recess. The amount of vertical force required will depend on the depth of the indentation. If the indentation is very shallow, the primary projection may almost roll or slide out into the passage. Simultaneously, the additional projection moves against the force exerted by the biasing means (15). As the rotation of the rider's foot increases, the projection follows the passage in the recess (10') in the direction of rotation until it leaves the passage and the projection is no longer in contact with the U-shaped mounting member.

As this occurs, the additional projection (11) rotates in its recess (11') and when the primary projection (10) is free of the U-shaped mounting means, the additional projection (11) can move out of the recess (11'), thus completely disengaging the foot support from the U-shaped mounting means.

Figure 2c shows the outer side of the arm depicted in Figure 2b. In this view, it is clear that the primary and additional projections are not visible when the stirrup is in normal use.

Figure 3a is a perspective view towards a side of a D-shaped foot support according to a further embodiment of the safety stirrup of the present invention. In this view, the mushroom shaped additional projection (22) can be seen. Above the additional projection is a discontinuous recess comprising an indentation (30a) and two passages (30b, 30c) for receiving a third projection on the D-shaped foot support. A recess (25) comprising an indentation and elongate passage for receiving a primary projection on the D-shaped foot support is also shown. Identical projections and recesses also exist on the other side of the foot support but cannot be seen in this view.

Figure 3b is a view of one arm of the U-shaped mounting member of the further embodiment showing the projection (25') to be received in the recess (25) depicted in Figure 3a. Recess (22') is for receiving the mushroom shaped additional projection (22) depicted in Figure 3a, the neck of the mushroom residing in the slot-shaped part of the recess, the head of themushroom being visible on the outside of the U-shaped member when the stirrup is in normal use. During normal use of the stirrup, a third projection (30') is located within the indentation (30a) depicted in Figure 3a. In the event of the rider being dismounted, the rider's foot moves out of the normal in-use position. The vertical component of the force exerted causes the D-shaped foot support to move

vertically upwards relative to the U-shaped support member, so that primary projection (25') moves out of the indentation in the recess (25) and into the elongate passage. Simultaneously, the additional projection (22) moves upwards in the recess (22'), the third projection (30') moving out of the indentation in the recess (30a) and into either passage 30b or 30c, depending on the direction of rotation of the D-shaped foot support. This movement of the third projection (30') is facilitated in part by flexing of the U-shaped member, which thus acts as a biasing means. As the rotation of the rider's foot increases, the primary projection (25') follows the moves along the recess (25) in the direction of rotation until it leaves the passage and the projection is no longer in contact with the U-shaped mounting member. As this occurs, the additional projection (22) rotates in its recess (22') and when the primary projection (25') is free of the U-shaped mounting means, the additional projection (22') can move out of the recess (22), thus completely disengaging the foot support from the U-shaped mounting means.

Figure 3c shows the outer side of the arm depicted in Figure 3b. In this view, it is clear that the head of the mushroom shaped additional projection would be visible when the stirrup is in normal use.

While the foregoing describes preferred embodiments of the invention, various modifications can be included without departing from the spirit and scope of the invention.